



TSMC97-542/98-021

serial no. 09/160,965

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

SUBJECT: Serial #: 09/160,965
File Date: Sept. 25, 1998
Inventor: Shau-Lin Shue and Syun-Ming Jang
Examiner: Kielin, Erik J.
Art Unit: 2813
Title: A NOVEL PLANARIZATION METHOD OF COPPER
DAMASCENE

DECLARATION UNDER 37 CFR 1.131

Honorable Commissioner of Patents & Trademarks

Washington, D.C. 20231

Sir:

I, Shau-Lin Shue and Syun-Ming Jang, hereby state:

1. I am a co-inventor of Claims 1-12 of the above-identified patent application.
2. Prior to February 26, 1998, we conceived of the idea for A Novel Planarization Method Of Copper Damascene, as described and claimed in the above referenced application, and a copy of the invention disclosure describing our invention entered the United States of America before February 26, 1998.

Conception is demonstrated by:

Exhibit 1, attached: Invention Disclosure A Novel Planarization Method of Copper Damascene by S. L. Shue, signed by him and witnesses (three pages, TSMC97-542, received before 2/26/1998).

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Exhibit 2, attached: letter to George O. Saile from TSMC / Patent Affairs, Subj: Comments of the Invention Disclosure, received before 2/26/1998.

Exhibit 3, attached: Invention Disclosure Method of Forming Al or Cu Damascene Structure by Syun-Ming Jang, signed by him and witnesses (two pages, TSMC98-021, received before 2/26/1998).

Diligence is demonstrated by:

Exhibit 4, attached: A Novelty Search at the US Patent Office – TSMC97-542 – for A Novel Planarization Method of Copper Damascene was written on February 12, 1998.

Exhibit 5, attached: A Novelty Search at the US Patent Office – TSMC98-021 Merged with TS97-542, Part 2 or 2 – Appended Search report – S.M. Jang was written on April 23, 1998.

Exhibit 6, attached: A first draft cover letter, subject: Patent Application Reference TSMC97-542/98-021 to Tessie Wang, Patent Department, TSMC was written on May 1, 1998.

Constructive Reduction to Practice:

The invention was constructively reduced to practice on September 25, 1998, by filing of the subject application.

Claims as they relate to the invention disclosure TSMC97-542:

In Exhibit 1, DETAILED DESCRIPTION OF THE INVENTION (page 1)

- Dual Damascene Patterning: see claim 1 “forming dual damascene” – S. L. Shue.
- Barrier Metal Deposition: see claim 1 “forming a barrier metal” – S. L. Shue.

- Seed Layer Deposition: see claim 1 “depositing a seed layer” – S. L. Shue.
- Copper Electroplating: see claim 1 “electroplating a copper layer” – S. L. Shue.
- Reverse Tone Photo: see claim 1 “forming a reverse tone photoresist mask” – S. L. Shue.
- Electroplating by reverse current: see claim 1 “by means of reverse current electroplating” – S. L. Shue.
- PR stripping: see claim 1 “stripping of said photoresist” – S. L. Shue.
- Cu/Barrier layer CMP: see claim 1 “planarizing by chemical mechanical polishing (CMP) said now exposed copper layer and barrier metal layer” – S. L. Shue.
- Cap layer: see claim 1 “sealing said copper layer with a cap layer” – S. L. Shue.
- Compare Figures 4 – 8 of the invention disclosure (pages 2-3) with Figures 2a-h of the subject patent application.

Claims as they relate to the invention disclosure TSMC98-021:

In Exhibit 2, COMMENT item 2

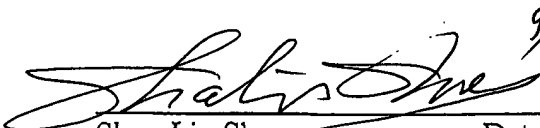
- Item 2, Fully reverse-tone is not necessary for practical use. Relaxed reverse-tone is more practical: see claim 11 “reverse tone photoresist mask also covers spaces between said damascene trenches ” and Figures 4a-d – S. M. Jang.

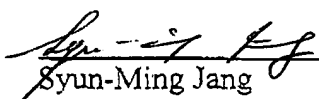
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States

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Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

 9/11/03
Shau-Lin Shue Date

 9/14/03
Syun-Ming Jang Date